ISS Technology Update

Volume 8, Number 6

Keeping you informed of the latest ISS technology

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Recently published industry standard server technology papers

Title	URL
Conveniently integrating HP ProLiant Lights-Out processors with Microsoft® Active Directory	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00190541/c00190541.pdf
Integrated Lights-Out technology: Enhancing the manageability of ProLiant Servers, 7th edition	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00257345/c00257345.pdf
Selecting power cords and jumper cables for use with HP ProLiant and BladeSystem servers, 3rd edition	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00130729/c00130729.pdf
Technologies in HP ProLiant G6 c-Class server blades with AMD Opteron™ processors	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01874575/c01874575.pdf
Technology and architecture of HP ProLiant AMD-based 300-series G6 (Generation 6) servers	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01889304/c01889304.pdf
Using the HP Plinth Kit for seismic anchoring of HP 10000 G1 series racks	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00251418/c00251418.pdf
HP ProLiant DL580 G5 server technology	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01891077/c01891077.pdf
Implementing Microsoft Windows Server 2008 R2 on HP ProLiant servers	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01639594/c01639594.pdf

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Understanding and interpreting SPECpower_ssj2008 results

Server benchmarks have traditionally focused almost entirely on server performance. As server power consumption and efficiency have become increasingly important issues, the need for objective and reproducible measures of server performance relative to power consumption has also become important. In late 2007, the Standard Performance Evaluation Corporation (SPEC) introduced the first SPECpower benchmark (SPECpower_ssj2008) to address this emerging need. SPEC is a non-profit corporation formed to establish, maintain and endorse a standardized set of benchmarks for high-performance computers. SPEC is supported by its member organizations which includes HP.

Structure of the SPECpower_ssj2008

The SPECpower_ssj2008 benchmark measures server performance in relation to its power consumption. The benchmark allows the use of various accepted power analyzers to measure the server's power draw. The benchmark harness is a program that receives power data electronically without human intervention. The program launches the workload and collects power and thermal sensor measurements. It then post-processes and reports performance, thermal, and power data.

SPECpawer_ssj2008 warklaad

SPECpower_ssj2008 uses a server side Java (ssj) workload to generate work for the server and to measure the compute performance. This workload met SPEC's requirements:

- It is scalable and multi-threaded.
- It is portable across a wide range of operating environments.
- It can be run quickly and efficiently at minimal cost.

Using a graduated warklaad ta measure perfarmance

SPECpower_ssj2008 uses a graduated workload to measure server performance and multiple target loads. With this methodology, the server performance and power consumption are measured at eleven different levels of server utilization for a fixed period of time (240 seconds). This provides a more complete picture of the server's performance and power consumption across a range of operating conditions.

For example, the benchmark results for the HP ProLiant DL385 G6 are shown in Table 1-1. The results include the server performance and power consumption at eleven different levels from zero to one hundred percent load. Zero percent load represents the active idle state of the server. The result is a performance-to-power ratio calculated for each ten percent increment of server load.

Table 1-1. Published SPECpower_ssj2008 result - Power performonce ond power summory for the HP ProLiont DL385 G6

Torget Lood	Actuol Lood	Server side Jovo Operations (ssj_ops)	Averoge octive power (watts)	Performonce to Power Ratio
100%	99.4%	535,814	260	2,062
90%	89.7%	483,541	246	1,962
80%	80.0%	431,269	234	1,847
70%	70.1%	377,831	220	1,715
60%	60.2%	324,171	207	1,565
50%	50.0%	269,338	194	1,386
40%	39.7%	213,708	181	1,181
30%	29.7%	160,021	168	953

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20%	20.1%	108,342	153	710
10%	10.0%	54,143	134	403
Active idle		0	124	0
Overall aperatians per watt				1,394

Colculoting ond interpreting SPECpower_ssj2008 results

The SPECpower_ssj2008 benchmark generates a final metric that is the overall operations-per-watt. This number is calculated by adding together the number of Java operations performed at each target load and dividing this number by the sum of the power consumptions at each target load. Thus, the overall operations-per-watt is an equally weighted average of the performance to power ratio taken across the entire operating range of the server.

Overall operations-per-watt is useful for a general comparison of performance and power between servers; however, it may be too broad a metric when considering specific application scenarios or utilization levels. If it is known that a server will be used in a heavily loaded environment, it is more important to compare the performance-to-power ratios of the server at higher utilizations and not focus as much on the overall performance–per-watt value.

SPEC Power futures

The SPECpower_ssj2008 is a relatively new, but increasingly important benchmark, and it continues to evolve. Version 1.10 of the benchmark, announced in April 2009, has added support for server blade configurations. SPEC has also published SPECweb2009, which is a power-oriented version of the SPECweb benchmark. Further developments in this area will be happening relatively quickly since power efficiency in the data center remains an important topic.

To contact an HP spec representative, click here: spec@hp.com.

Additionol resources

For additional information on the topics discussed in this article, visit the following websites:

Saurce	Email / Hyperlink
SPEC.org SPECpower_ssj2008 moin poge	http://www.spec.org/power_ssj2008/
HP ProLiont Servers Benchmorks poge	http://h18004.www1.hp.com/products/servers/benchmarks/index.html

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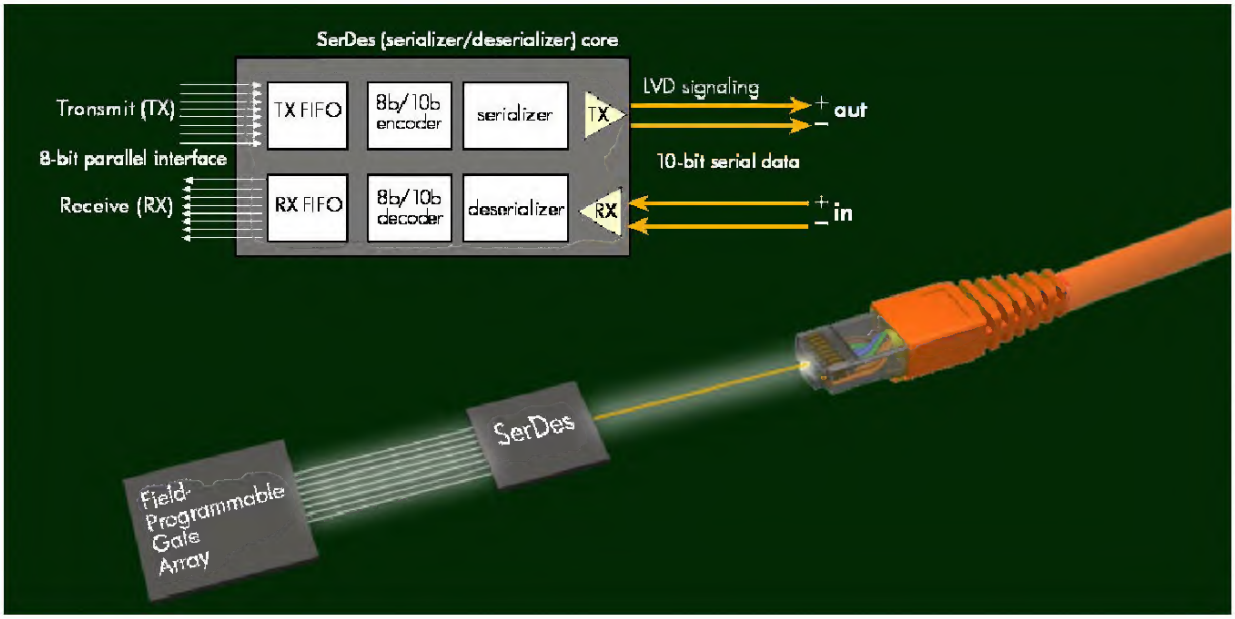
Effective data rate of SAS Technology

Serial Attached SCSI (SAS) uses differential signaling to transfer data over a physical link, or phy. This reduces the effects of capacitance, inductance, and noise experienced by parallel SCSI at higher speeds. SAS communication is full duplex, which means that each phy can send and receive information simultaneously over the two wire pairs.

SAS encodes (embeds) the clock signals into the data stream, which eliminates the skew problem with aligning data and clock signals experienced by parallel SCSI buses. SAS communication requires a device called a serializer/deserializer (SerDes) to convert parallel data into a serial bit stream and vice versa. The SerDes chip contains a parallel digital interface, First-In-First-Out (FIFO) caches, an 8 bit/10 bit (8b/10b) encoder and decoder, a serializer, and a deserializer (see Figure 2-1).

Figure 2-1. The SerDes chip canverts 8-bit parallel data ta 10-bit serial data.



The 8b/10b encoder converts each 8-bit data byte to a 10-bit transmission character as it embeds the clocking information into the data stream. This adds about 20 percent embedded overhead to the data stream, which is why the effective data rate of SAS (and SATA) communications is calculated as follows:

Effective data rate = Physical link rate × 0.8

As such, the effective data transfer rates for SAS technologies (per direction) are listed in Table 2-1. The SAS interface allows data transfer to be scaled by using a combination of multiple physical links to create two connections (2x, 3x, 4x, or 8x) per port.

Table 2-1. Physical link rates and effective data transfer rates per direction

Physical link rate	Generation	Effective Data Rate*	4x links
1.5 Gbps	SAS-1, SAS-1.1	150 MB/s	600 MB/s
3 Gbps	SAS-1, SAS-1.1	300 MB/s	1200 MB/s
6 Gbps	SAS-2, SAS-2.1	600 MB/s	2400 MB/s

*Effective Data Rate shown is converted to bytes.

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New feature in HP Integrated VMware ESXi 4.0 adds support for Smart Array and network devices

New HP CIM providers are now available for ESXi 4. The new providers contain all of the server inventory, alerting and status support that was available for ESXi 3.5, and adds corresponding support for Smart Array and network devices. This new management data is reported to HP Systems Insight Manager (SIM) along with the server data that was previously available. These new providers give the user additional functionality:

- View detailed storage health information from HP-SIM. This includes Smart Array controllers, internal drive cages, external storage enclosures, data and spare drive information, and logical volume information.
- Send CIM indications on status changes and prefailure notifications for Smart Array to HP SIM.
- View information on the network subsystem including Ethernet ports, statistics, port link status, IP and Mac addresses.
- View basic HP Smart Array health information in vCenter.

When the HP integrated ESXi 4.0 image is installed from the ISO, the providers are installed, as well. When installing the VMware ESXi image, the HP Offline Bundle must be used to install the providers. In either case, the offline bundle can be used to install HP providers for the first time or to upgrade existing HP providers.

The HP ESXi Offline Bundle and installation instructions are available from the HP website: http://h20000.www2.hp.com/bizsupport/TechSupport/SoftwareDescription.jsp?lang=en&cc=us&prodTypeId=15351&prodSeriesId=1121516&prodNameId=3288134&swEnvOID=4040&swLang=8&mode=2&taskId=135&swItem=MTX-25f06077ad5541f5a962dd2a69.

For more information on the offline bundle, refer to the HP Offline Bundle section.

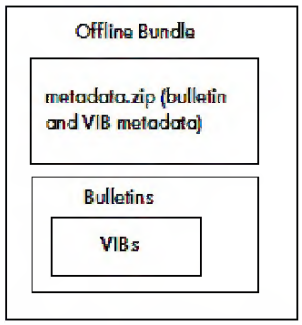
The integrated image is available from SW Depot at www.hp.com/go/esxidownload.

HP Offline Bundle

The capability for new components to be added to a generic Integrated VMware ESXi 4 installation utilizes vSphere Installation Bundles (VIBs). These are packages that contain the files required to distribute modules on ESX. The modules can be added to VMware ESXi 4 using the VMware update technology. The provider VIB and other HP supporting VIBs are part of the HP Offline Bundle.

An offline bundle (Figure 3-1) is a single .zip file that is used for software distribution. It contains a metadata.zip file, containing bulletins, and all the VIBs to which the bulletins refer. The bulletins allow grouping of VIBs into a logical group; for example, one bulletin might contain all VIBs that solve one particular problem or provide the same enhancement.

Figure 3-1. Contents of the offline bundle



Product ond pricing informotion

The HP ProLiant servers that are certified with VMware ESXi 4.0 are listed on the HP website http://h71028.www7.hp.com/enterprise/us/en/servers/4x-servers.html.

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Meet the Expert—Jeff Plank

Jeff Plank is a Master Technologist with the Chief Technology Office (CTO) for HP Industry Standard Servers (ISS). The qualifications to become a Master Technologist range from having a major technical impact on the strategic direction of HP to addressing unmet customer needs.

Jeff's manager, Greg Huff, says that Jeff combines traditional engineering knowledge with rare skills such as IP creation, IP licensing, and contract negotiation. Jeff unites those skills with his "near infinite patience and persistence in dealing with roadblocks and impediments."

Jeff's hobbies—backpacking, hiking, fishing, spelunking, and Boy Scouts—help him clear his mind and improve his focus at work. He especially likes helping young people learn leadership skills to achieve their goals. He and his wife, Tina, have two boys, Kyle (17), an Eagle Scout, and Ryan (14). The entire family is heavily involved in band, Scouts, and preparation for college.

Name: Jeff Plank
Title: Master Technalagist, CTO, ISS
Years at HP: 18
University: Austin Callege, BA in Camputer Science and Math
Texas A&M, MS in Saftware Engineering
US Patents: 2 Active Applicatians

Alwoys foscinoted by how things work

Jeff has always enjoyed figuring out how things work. His fascination with software started when he learned programming on his high school's Apple II computers. He particularly liked to find "the absolute minimum flexible code set to accomplish the assigned task." That experience inspired him to obtain his computer science and software engineering degrees in college and graduate school.

Hoving o mojor technicol impoct ot HP

Master Technologists make multiple major contributions over time. One of Jeff's contributions (his favorite) occurred in 2000 with his first product launch, the development of HP Windows NAS business. HP was the first to market with a Windows Storage Server product. At the time, it was state-of-the-art, with an initial offering of ~1.5 terabytes of capacity in 4 storage cabinets. In comparison, 2 TB will fit on a single disk drive today.

Addressing unmet customer needs

In the CTO, Jeff and others spend a great deal of time listening to customers' concerns, business problems, and their future directions. From this information, technologists design the hardware, software, and solutions that their customers will need. Jeff says one forum that enables such collaboration is the Technology Advisory Council. TAC allows HP technologists to meet globally with various system architects who help the technologists make design choices for future solutions.

Whot he thinks customers should know

Jeff believes that in the next 8 to 10 years, solid state memory will undergo tremendous changes in its underlying properties. With future development, solid state memory devices, currently in solid state drives and PCIe cards, have the potential to dramatically modify the power consumption, cost, performance, and physical space that traditional rotational media currently occupies.

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